INSTALLING BOILERS AND WATER HEATERS IN VIRGINIA

Overview

Various organizations can be involved in the installation of high-pressure, low pressure boilers, and water heaters in Virginia – Mechanical Contractors, Plumbers, HVAC Installers, or Boiler Manufacturer representatives, to name a few.

Most of these organizations are familiar with the installation requirements for State Building Codes but not the State Boiler Codes. The purpose of this article is to bridge the gap and provide guidance as related to the major installation requirements of boilers and pressure vessels.

The Virginia Boiler and Pressure Vessel Rules and Regulations [Boiler Rules] became effective on July 1, 1974. This article is focusing on the major installation requirements rather than the specific rules on operating, maintenance, repairs or alterations of boilers and pressure vessels.

Definitions

"ASME Code" means the Boiler and Pressure Vessel Code of the American Society of Mechanical Engineers approved and adopted by the governing council of such society and approved and adopted by the board.

"Boiler" means a closed vessel in which water is heated, steam is generated, steam is superheated, or any combination of them, under pressure or vacuum for use externally to itself by the direct application of heat. The term "boiler" shall include fired units for heating or vaporizing liquids other than water where these units are separate from processing systems and are complete within themselves.

"Certificate inspection" means an inspection, the report of which is used by chief inspector to decide whether or not a certificate may be issued. This certificate inspection shall be an internal inspection when required; otherwise, it shall be as complete an inspection as possible.

"Heating boiler" means a steam or vapor boiler operating at pressure not exceeding 15 psig, or a hot-water boiler operating at pressures not exceeding 160 psig or temperature not exceeding 250 ☐ F at or near the boiler outlet.

"High-pressure, high-temperature water boiler," means a water boiler operating at pressures exceeding 160 psig or temperatures exceeding 250 ° F at or near the boiler outlet.

"Hot water supply boiler" means a boiler furnishing hot water to be used externally to itself at pressures not exceeding 160 psig or temperatures not exceeding 250 ° F at or near the boiler outlet, with the exception of boilers which are directly fired by oil, gas or electricity where none of the following limitations are exceeded:

a. Heat input of 200,000 BTU per hour;
b. Water temperature of 210 ° F; or
c. Nominal water containing capacity of 120 gallons.

"Inspection certificate" means a certificate issued by the chief inspector for the operation of a boiler or pressure vessel.

"Power boiler" means a boiler in which steam or other vapor is generated at a pressure of more than 15 psig.

"Pressure vessel" means a vessel in which the pressure is obtained from an external source, or by the application of heat from an indirect source, or from a direct source, other than those boilers defined in Part 1 of this chapter.

"Owner or user" means any person, partnership, firm or corporation who is legally responsible for the safe operation of a boiler or pressure vessel within the Commonwealth.

"R Certificate of Authorization" means an authorization issued by the National Board for the repair and alteration of boilers and pressure vessels.

"Standard boiler or pressure vessel" means a boiler or pressure vessel, which bears the stamp of the Commonwealth of Virginia, the ASME stamp and the National Board stamp when applicable.

"Water heater" means a vessel used to supply: (i) potable hot water; or (ii) both space heat and potable water in combination which is directly heated by the combustion of fuels, electricity, or any other source and withdrawn for use external to the system at pressures not to exceed 160 psi or temperature of 210 ° F. This term also includes fired storage water heaters defined by the Virginia Uniform Statewide Building Code as a "water heater".

Exemptions – Section 40.1-51.8 – Code of Virginia

The provisions of this article shall not apply to any of the following:

1. Boiler or unfired pressure vessels owned or operated by the federal government or any agency thereof;

2. Boilers or fired or unfired pressure vessels used in private residences or apartment houses of less than four apartments;

3. Boilers of railroad companies maintained on railborne vehicles or those used to propel waterborne vessels;

4. Hobby or model boilers as defined in Section 40.1-51.19.1;

5. Hot water supply boilers, water heaters, and unfired pressure vessels used as hot water supply storage tanks heated by steam or any other indirect means when the following limitations are not exceeded:

    a. A heat input of 200,000 British thermal units per hour;

    b. A water temperature of 210 ° Fahrenheit;

    c. A water-containing capacity of 120 gallons;

6. Coil type hot water boilers without any steam space where water flashes into steam when released through a manually operated nozzle, unless steam is generated within the coil or unless one of the following limitations is exceeded:

    a. Three-fourths inch diameter tubing or pipe size with no drums or headers attached;

    b. Nominal water containing capacity not exceeding six gallons; and

    c. Water temperature not exceeding 350 ° Fahrenheit.

Most commercial boilers need to be registered and inspected by qualified Inspectors certified by the Department of Labor and Industry and have a Certificate of Inspection before their initial operation. The same rules apply to commercial water heaters but not residential size water heaters. In others words, any commercial water heater greater than 120 gallons – no matter the heat input – needs a Certificate of Inspection before its initial operation.

General Installation Requirements

A. All boilers that are required by the Virginia Code to have a Certificate of Inspection before operation must be constructed and installed in accordance with the American Society of Mechanical Engineers (ASME) Code and, except for the Cast Iron Boilers, be registered with the National Board of Boiler and Pressure Vessel Inspectors. Heating boilers as defined above have to be stamped with ASME Code Stamps H or M. High pressure, high temperature water and power boilers have to be stamped with ASME Code Stamps S, M, or E.

B. Any organization that installs piping by welding or mechanical means to a high pressure, high temperature water or power boiler up to the first stop valve or second stop valve for boilers in battery has to have ASME Code Stamps S, PP, or A.

C. Only commercial sized water heaters that are ASME Code stamped H, HLW or labeled with a certified third party (AGA, UL, etc.) may be installed in Virginia. Model Numbers are needed for any certified third party label. Note that water heaters may be used for combination potable water/heating. Any water heaters used solely for heating must meet all installation requirements for a boiler.

D. All boilers and water heaters must be protected with ASME and National Board marked Safety (Relief) Valves. At least one Safety (Relief) Valve has to be set at or below the maximum allowable working pressure (MAWP) of the boiler/water heater and others, if required, must be set within the range permitted by the Boiler Rules.
In addition, the Safety (Relief) Valve has a relieving capacity that must meet the minimum requirements for the boiler/water heater. The minimum requirements for the boiler/water heater can be found on the code rating plate for the object. The ASME rated relieving capacity valves – not AGA valves – shall be used for boilers and water heaters. Remember to assure that the discharge of Safety (Relief) Valves are properly installed, supported and located so as to prevent injury.

E. Each individual automatically fired boiler/water heater, in addition to the control used for normal operation, shall have a separate safety limit control that will cut off the fuel supply to prevent the pressure (temperature) from exceeding the maximum allowed. For any boiler/water heater installed after July 1, 2003, the safety limit shall provide for manual reset.

F. Each automatically fired and unattended steam or vapor system boiler shall be equipped with two (2) operational automatic low water fuel cut offs designed for the MAWP of the boiler. This unit shall be installed with a proper drain valve and discharge piping. For any steam boiler installed after July 1, 2003, the lower of the controls shall provide means for safety shutdown and lockout such as a manual reset.

G. Each automatically fired hot water heating boiler with heat input greater than 400,000 Btu/hr shall have an automatic low-water fuel cut off that has been designed for the MAWP for hot water service. For any boiler installed after July 1, 2003, the low-water fuel cut off shall provide for manual reset.

H. When boilers are installed in either existing or new buildings, a minimum of two (2) feet on all service sides shall be provided. Boilers having manholes shall have five (5) feet clearance from the manhole opening and any wall, ceiling, or piping that will prevent a person from entering the boiler.

I. A permanent source of outside air shall be provided for each boiler room to permit satisfactory combustion of the fuel as well as proper ventilation of the boiler under normal operating conditions.

J. Installing contractors shall maintain or obtain from the manufacturer a data report for each installation completed. The report shall list:

(1) Each control and safety device installed in accordance with CSD-1 1998 Edition;
(2) Name of the manufacturer and model number of each control and safety device;
(3) Operational test performed.

Items (1), (2), and (3) above shall be verified by the signature of an authorized representative of the installing contractor on this report. An example of an acceptable data report form is contained in Nonmandatory Appendix C of CDS-1 1998 Edition.
This report shall be made available to the authorized inspection agency or the inspector for action as required by the local building official.

K. Rules for the proper installation of blowoff valves or piping; feedwater piping, check valves, or stop valves; expansion tanks, gauges, gauge glasses, pressure reducing valves, flame safeguards, etc., can be found in the Boiler Rules at www.doli.virginia.gov by clicking Boiler and Pressure Vessel Safety.

L. Any welded repair or alteration to a boiler/water heater must be performed by an organization holding an "R" Certificate of Authorization – even if the object is new.

Conclusion

After the installation is complete, the owner of the boiler/heater has to arrange for the registration and inspection of the boiler/water heater. Have the owner or user (in some cases the Installer is considered the user for turnkey projects) contact their Inspector for a certificate inspection. Only qualified Inspectors certified by Department of Labor and Industry (DOLI) can perform the certificate inspection. A list of Inspectors can be found on the DOLI web site – www.doli.virginia.gov below the Boiler and Pressure Vessel Safety listing. The Inspector will submit all required forms. After a certificate inspection is performed with satisfactory results, DOLI will issue a Certificate of Inspection upon payment of a certificate fee of $20.00 for each boiler/water heater. In some counties and cities building officials will not issue a Certificate of Occupancy until the required certificate inspection is completed.

More information regarding installing boilers including FAQs, Interpretations and Boiler Rules can be found on the Department of Labor and Industry's web site - www.doli.virginia.gov and National Board web site – www.nationalboard.org